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The Choice of Organizational Form: Vertical Integration versus other Methods of Vertical Control

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Abstract

Vertical integration is a fundamental corporate strategy of interest to the fields of strategic management and organizational economics. This paper synthesizes theoretical arguments and empirical findings from this literature to identify the underlying advantages and disadvantages of choosing a vertical integration strategy. It then suggests that these arguments can be put into a broader framework with vertical financial ownership and vertical contracting being seen as essentially isomorphic phenomena. The key theoretic question involves predicting when market mechanisms are sufficient, when intermediate forms of vertical contracting become necessary, and when formal vertical integration is the preferred strategic alternative. The concluding section of the paper provides a framework for making this analysis based on a synthesis of agency and transaction cost perspectives.

The Choice of Organizational Form:
Vertical Integration versus other Methods of Vertical Control

Although economists and strategic management researchers recognize that there are many possible motives for vertical integration (Arrow, 1975; Harrigan, 1983), there has not been a systematic synthesis of the considerable body of literature in the field of industrial organization and strategy on this important strategic option. A unified conceptual framework is a particularly important foundation for further research from a strategic management perspective, since this field draws its strength from integrative research approaches (Bowman, 1989; Huff, 1981; Jemison, 1981). This paper therefore suggests a general theory for predicting and prescribing vertical integration that integrates and extends previous work done under both the strategy and industrial organization paradigms. Although there are some discrepancies in the way vertical integration is described and investigated in these literatures, the basic argument is that the literature on vertical integration has in fact been complementary.

The disadvantages of complete financial ownership suggest that corporate strategy research should examine more carefully the alternative governance structures of vertical control, including long-term contracts, joint ventures, networks, and franchising. The second section of the paper illustrates the isomorphic nature of vertical control via contracting compared with complete financial ownership via vertical merger. It is proposed as a general theorem that every motive for vertical merger may be achieved alternatively by an appropriate vertical contract, when transaction costs are absent. Although theories of vertical financial ownership thus can be described more generally as theories of vertical control, we are still left with the task of predicting and prescribing which form organizational control will take. Put differently, the formulation of vertical integration strategies (Harrigan, 1984) needs to be supplanted by a more general discussion of strategies to effectively achieve corporate control objectives. The last section of the paper advances a general theory for explaining and predicting the pattern of vertical integration and vertical contracting in different environments which draws on both a transaction cost perspective and on agency theory.

The Advantages of Vertical Integration

An exhaustive review of the economic and strategy literature (Mahoney, 1989) suggests that the motives for vertical integration may be classified into the four major categories shown in Table 1: (1) transaction cost considerations; (2) strategic considerations; (3) output and/or input price advantages; and (4) uncertainties in costs and/or prices.

Insert Table 1 about here

While no firm will be motivated by all of these potential advantages, taken as a whole they illustrate the broad utility of this corporate option, a usefulness that justifies greater theoretical and empirical attention than has been given to vertical integration strategies to date.

Transaction Cost Considerations. Vertical integration is often chosen to minimize the cost of transactions (Coase, 1937; Williamson, 1985), costs which include negotiating, adapting, monitoring, and enforcing buyer-supplier relationships (Jensen & Meckling, 1976). A good example of the potential cost savings of vertical merger is the avoidance of sales taxes when arms-length contracting is replaced by internal transfers (Coase, 1937). More subtly, vertically integrated petroleum firms have found it profitable to increase the price of crude oil relative to the price of final products in order to shift as much of their reported earnings as possible to the raw materials extraction stage, which enjoys tax preferences associated with resource depletion (Bolch & Damon, 1978). Similar strategies can be found in other basic conversion industries such as copper, aluminum and steel (Scherer, 1980).

A second fundamental motive for vertical integration is the failure of markets to satisfactorily handle certain transactions (Casson, 1984). Important sources of market failures include externalities (Dahlman, 1979), increasing returns and sunk costs (Baumol, Panzar & Willig, 1982) and market imperfections (Wolf, 1979; Yao, 1988). These market frictions violate the standard assumptions of competitive equilibrium models. Prices are no longer sufficient statistics. Long-term relational contracts (Macneil, 1980), joint ventures (Harrigan, 1988; Hennart, 1988a; Kogut, 1988), franchising (John, 1984; Norton, 1988; Rubin, 1978), networks (Thorelli, 1986;

Jarillo, 1988), quasi-firms (Eccles, 1981) and vertical financial ownership (Harrigan, 1983; Williamson, 1971) are some of the "institutions of capitalism" (Williamson, 1985) which emerged in response to the inadequacies of classical market contracting.

Williamson's (1985) seminal research develops a well-grounded theoretical framework for explaining and predicting this market failure. The basic idea is that contractual difficulties arise when opportunistic agents (Anderson, 1988; Maitland, Byrson & Van De Ven, 1985) engage in frequent transactions in an environment of sufficient uncertainty and/or complexity to surpass bounded rationality capabilities (Simon, 1978). The risk of self-interested agents utilizing asymmetric information to their advantage is high in such environments and vertical financial ownership is one response to this inadequacy of classical market contracting (Harrigan, 1983; Williamson, 1975). Contractual problems become acute when there are small numbers bargaining, a situation that occurs when transactions involve human, physical or site "asset specificity" (Spiller, 1985; Williamson, 1979). Human asset specificity involves uniquely related learning processes or teamwork. Physical asset specificity includes requirements for specialized machine tools and equipment. Site specificity occurs when unique locational advantages exist, as, for example, when a power plant is located near a coal mine to save on transportation costs (Joskow, 1985a). Vertical integration can assure requisite inputs in such situations and the importance of asset specificity in explaining and predicting vertical financial ownership is supported by a large body of literature including case studies (Butler & Carney, 1983; Globerman & Schwindt, 1986; Goldberg & Erickson, 1987; Hennart 1988b; Klein, Crawford & Alchian, 1978; Palay, 1984; Stuckey, 1983; Teece, 1976), formal modeling (Kleindorfer & Knieps, 1982; Masten, 1982; Riordan & Williamson, 1985) and statistical testing (Anderson & Schmittlein, 1984; Armour & Teece, 1980; Caves & Bradburd, 1988; John & Weitz, 1988; Joskow, 1985a; Levy, 1985; MacDonald, 1985; MacMillan, Hambrick & Pennings, 1986; Masten, 1984; Monteverde & Teece, 1982; Walker & Weber, 1984, 1987).

A last important transaction cost motive for vertical integration involves economies of scope (Baumol, Panzar, & Willig, 1982; Teece 1980; Williamson, 1975), including technological complementarities (Bain, 1968). The standard example of vertical merger to achieve economies of

scope is found in the integration of iron and steel production (Lavington, 1927). An example of major technological interdependency can be found between equipment manufacturing and operations in the telecommunications industry (Phillips, 1983). Baumol, Panzar and Willig (1982) maintain that economies of scope are a sufficient condition for vertical integration. However, as Teece (1980) has emphasized, economies of scope do not explain the "scope of the enterprise".

Strategic Considerations. In addition to transaction cost considerations, the enterprise may achieve strategic advantages via vertical integration. Vertical integration is frequently cited, for example, as a means of increasing barriers to entry (Bain, 1968; Porter, 1980). When entry into two separate stages of production is already difficult because of large capital requirements, combining successive stages will further raise entry barriers, because new entrants must enter two stages rather than one. Vertical integration has the potential disadvantage of also being a major source of exit barriers (Harrigan 1985b), but exit barriers themselves may play a compensating positive role if they constitute additional barriers against prospective entrants (Porter, 1980).

A motive related to entry barriers is the strategy of "price squeezing" (Joskow, 1985b). Vertical integration may enable a firm to eliminate competition by lowering the price of the output while simultaneously raising the price of the input. Edwards (1953) contended, for example, that the price of crude oil was raised and the price of gasoline was lowered to such a degree via vertical integration that the independent refiner could not operate. Adams (1964) similarly argued that the large integrated steel companies utilized a price squeeze to eliminate smaller, less integrated competitors.

Vertical integration may be used strategically not only in an environment of intense competition, but in regulated environments as well. If a firm is subject to effective rate-of-return regulation in the final stage of production but is permitted to integrate backward, for example, it may be able to avoid the effect of the regulatory constraint by transfer pricing the intermediate product above marginal cost (Dayan, 1975).

Vertical integration can even promote oligopoly by improving the monitoring necessary to maintain coordination. Adelman (1972) suggested that vertical integration into refining by the highly concentrated crude oil suppliers enhanced stability of coordination by making it more

difficult for an oligopolist to plan secretly to increase market share. Since there were few significant independent refiners, no company could increase its output of crude oil without first building refineries and distribution systems which clearly signaled their plans to competitors. Vertical integration thus may evolve as a means of maintaining oligopolistic discipline and may provide mobility barriers (Caves & Porter, 1977) which sustain the stability of strategic groups (McGee & Thomas, 1986; Newman, 1978). Differences between existing firms in their degree of vertical integration appear to have led to difficulties in agreement on the desirable vertical price structure. Even more problematic, changes in vertical integration structure can increase the threat of entry as it has in steel (Adams & Dirlam, 1964), petroleum (de Chazeau & Kahn, 1959), and aluminum (Scherer, 1980).

Output and Input Price Discrepancies. If output and input prices are not given to the firm, then there are several possible explanations for vertical integration. In the successive monopoly case, Spengler (1950) considers a product that passes through three successive stages of production before being ready for sale to consumers. Each stage of production contains sufficient monopoly power to charge a price above the competitive level. Here, a vertically integrated firm controlling all three stages of production can earn a larger profit than can be obtained by the "myopic chain monopoly" (Greenhut & Ohta, 1976). The essential idea is that the vertically integrated producer can evade the monopoly prices imposed by upstream firms.

In the case of bilateral monopoly (Machlup and Taber, 1960), vertical integration facilitates arriving at the input choice consistent with joint profit maximization under non-integrated bilateral monopoly (Williamson, 1975). Internal organization minimizes strategic bargaining and resolves the conflict of the division of profits. The problem of firms being "locked in" to a vertical relationship is not uncommon (Klein, Crawford & Alchian, 1978). Vertical integration minimizes appropriation risk (Barney, 1986; Walker, 1988).

In the case of an upstream monopoly, if there exists a variable-proportions technology (Warren-Boulton, 1978) for the final product, vertical merger permits the integrated firm to achieve efficiency in factor utilization. As a first approximation these cost savings accrue as additional profits to the integrating monopolist (Mallela & Nahata, 1980; McGee & Bassett, 1976;

Schmalensee, 1973; Vernon & Graham, 1971; Waterson, 1982). Abiru (1988) extends this stream of literature to include the more empirically relevant case of variable-proportions technology and successive oligopolies.

The price discrimination incentives for vertical integration can be elucidated by the example of an intermediate good monopolist selling to two downstream competitive industries. The upstream monopolist can increase profits by selling the intermediate product at a lower price to the downstream firm with the relatively higher price sensitivity (Perry, 1978). Vertical integration by the upstream monopolist can eliminate incentives for arbitrage of the intermediate product between the downstream firms. Perry (1980) contends that forward integration by Alcoa in the period 1888-1930 was inspired by price discrimination. Alcoa integrated into the relatively more price sensitive markets, such as cookware (Hale, 1967).

Crandall (1968) submits that Ford's expansion into competitive components markets similarly was motivated by the desire to price discriminate. Ford purchased Auto-Lites battery plant and obtained more revenue from those who used their vehicle the most (Weintraub, 1949). Asset specificity of parts and economies of scale in producing repair parts also tend to lock customers in with an automobile manufacturer.

Uncertain Costs and Prices. Vertical integration is a potential response to the stochastic elements confronting the firm. Arrow (1975) examined uncertainty in the supply price of the upstream good by focusing on asymmetric information between parties at the upstream and downstream stages. A downstream firm has the incentive to purchase one or more upstream firms because this improves its pricing forecast and thus its ability to purchase the appropriate level of capital. Carlton (1979) presents a similar model in which both output and input firms face uncertainty in demand and firms must make decisions concerning price and production before actual demand is observable. In this case there is some risk of supply failure to the customer as well as risk to the seller of overproduction. Vertical integration is a means of transferring this risk. Firms integrate to ensure a supply of input for their "high probability" demand and continue to purchase their "low probability" demand.

Green (1986) presents a model in which the price in the intermediate market is fixed so that fluctuations in external demand for the intermediate product results in rationing of either upstream or downstream firms. Integration allows the combined firm to avoid rationing, and thus avoid demand uncertainty.

While the strategy literature tends to agree on many of the potential advantages of vertical integration that have been given more detailed attention in the organizational economics literature, two points of apparent disagreement concern demand uncertainty and technological uncertainty. It is a time honored tradition in the economics literature to argue that vertical integration is motivated by the attempt to assure supply (Dennison, 1939; Frank, 1925; Willoughby, 1901) and to avoid the risk of foreclosure of markets (Allen, 1971; Grimm & Harris, 1983). Several empirical studies have supported the hypothesis that demand or volume uncertainty leads to increased vertical integration (Anderson & Schmittlein, 1984; Levy, 1985; Walker & Weber, 1984, 1987). Levin (1981) found, for example, that vertical integration into crude production for oil refining in the 1948-1972 period reduced the variance of profits. Recent work in the strategy field by Harrigan (1985a, 1986) however, yielded a negative relationship between demand uncertainty and the vertical integration strategy.

I submit that the Williamsonian view that uncertainty leads to **greater** vertical integration and the Harrigan view that uncertainty leads to **less** vertical integration can be reconciled. Williamson's statement is a conventional comparative statics argument that <u>if the level of asset specificity remains constant</u>, then an increase in uncertainty increases the likelihood of vertical integration. Harrigan, on the other hand, is analyzing the effect of uncertainty in a dynamic contingency framework that incorporates the dimensions of stages, breadth, degree and form of integration. To translate Harrigan's view in Williamson's terms: an increase in uncertainty may lead a firm to utilize less firm-specific assets. In consequence, less vertical integration would obtain in the long-run. But this does not contradict Williamson, who only argues that vertical integration will increase (under uncertainty) if asset specificity remains constant.

Vertical integration may also be an adaptive response to the problems of measurement uncertainty (Alchian & Demsetz, 1972). In particular, shirking problems in team production

induces vertical integration (Jones, 1984). When output depends on joint efforts, individuals have the incentive to "free-ride" in hopes of receiving greater reward than their efforts would otherwise dictate. Empirical studies are consistent with the hypothesis that measurement uncertainty of this type leads to vertical integration (Anderson & Schmittlein, 1984; Anderson, 1985).

Measurement uncertainty and quality uncertainty are also important factors that lead to performance ambiguity (Jones, 1987). The need to reduce quality uncertainty for key inputs may spur backward integration, while the need to assure point-of-sale service, which is often critical for new products, may necessitate forward integration (Harrigan, 1986).

Finally, the problem of technological uncertainty (Hennart, 1982; Teece, 1982) and the trading of technological knowledge may lead to vertical integration (Arrow, 1971). Here again an apparent disagreement can be found in the literature. Armour and Teece (1980) argued that the strong relationship between research intensity and vertical integration in the petroleum industry was due to market failures in information exchange. However, Harrigan (1986) and Walker & Weber (1984, 1987) found that technological uncertainty was associated with less vertical integration. The resolution of apparent disagreement here requires care to not confound asset specificity and uncertainty. If technological uncertainty leads to the utilization of more flexible (less firm-specific or product-specific) technologies, a link suggested by Balakrishnan and Wernerfelt's (1986) model, then less vertical integration obtains.

The problems of recognition, disclosure, team organization and dissipation that are involved in contracting under technological uncertainty all suggest a decision to vertically integrate (Caves, 1982; Teece, 1982). The effect of technological uncertainty on vertical integration may be especially influenced by the coordination costs of contracting for many parts in a system. Monteverde and Teece (1982) argued that the automobile electrical system involved substantial interdependencies and were consequently produced in-house. The Walker and Weber (1984, 1987) automobile studies could be updated to consider these system coordination influences on the technological uncertainty--vertical integration linkage.

Uncertainty can take many forms.

(i) Parametric or structural (Langlois, 1984).

(ii) perceptual or market based (Downey, Hellriegel, & Slocum, 1975).

(iii) volume, measurement, quality, or technological.

In the absence of any of these uncertainties, the firm need not exist (Coase, 1937; Knight, 1921; Williamson, 1975). As uncertainty increases, not only is the firm called into existence, there are increasing arguments for expanding the scope of organizational activity through vertical integration. More specifically, the same arguments found in the basic theory of the firm (Coase, 1988; Penrose, 1959) can be extended to justify vertical integration as a corporate form (Harrigan, 1983; Williamson, 1975).

To ascertain the effect of increased "uncertainty" on vertical integration, however, researchers must specify the nature of the uncertainty, the context of the analysis (static or dynamic), and the interaction of uncertainty with other important variables such as asset specificity (Anderson, 1985; Walker & Weber, 1984). Clearly, the economic and strategy literature has offered an impressive menu of advantages for the corporate strategy of vertical integration. But what are the advantages of vertical integration that are generalizable?

(1) **Profit.** Vertical integration may most effectively achieve the profit incentive since preemptive claims on profits between separate firms are eliminated.

(2) **Coordination.** The firm has better control of opportunistic behavior due to the authority relationship (Dow, 1987) within the firm. Managers of the divisions can be required to cooperate and promotions can be adjusted to achieve such behavior.

(3) **Audit and Resource Allocation.** The auditing powers of the firm are superior to the auditing capabilities of contracting parties (Williamson, 1975). A firm has the legal right to audit its divisions but no right to audit outside contractors. Integrated firms have superior information upon which they can base allocations to their divisions so that the incentive for those divisions to use their information strategically (to the detriment of the enterprise's profits) is eliminated (Crocker, 1983). Furthermore, improved information enables the firm to allocate personnel to

tasks more effectively.

(4) **Motivation.** A fourth advantage of the vertically integrated firm comes from the quasi-moral involvement that may develop within its boundaries. Particularly successful organizations inculcate an ungroundable but vital sense of human solidarity, and these clan-like emotions can have positive productivity impacts (Ouchi, 1980). Equity and due process develops in internal labor markets (Doeringer and Piore, 1971) and institutional and personal trust relations evolve. Selection, training, and socialization may minimize the divergence of preferences of team members (Eisenhardt, 1985; Ouchi, 1980).

(5) **Communication.** A fifth advantage of the vertically integrated firm is the development of a coding system which increases communication efficiencies. The standardization of language is seen in accounting systems and other reporting systems. Admittedly, these economies could be obtained via recurrent contracting but the efficiencies of the coding may be impaired due to the risk of opportunism. Firms are arguably better than markets in communicating and coding respects because the hazards of opportunism are mitigated due to superior auditing and greater incentive harmony within firms. The upshot is that firms (within capacity limits) have an information processing advantage, and this advantage complements superior auditing capabilities (Sandler & Cauley, 1980). In summary, when a firm vertically integrates, ownership changes (Grossman & Hart, 1986), incentives change, and governance structures (ability to monitor and reward) change.

Disadvantages of Vertical Integration

While the economics literature has been particularly strong in articulating the advantages of vertical integration, it has given far less attention to the disadvantages of the vertical integration strategy. Due to the strong simplifying assumptions made by most economists concerning the cognitive and informational capabilities of a firm's workers and managers, implementation problems in particular have been either neglected or suppressed. Strategic management researchers, on the other hand, have begun to focus on the implementation problems of vertical merger and have provided an analysis which is complementary to the economics

literature.

The disadvantages of vertical integration, summarized in Table 2, may be classified under four major categories: (1) bureaucratic costs; (2) strategic costs; (3) production costs; and (4) long-run dynamic costs.

Insert TABLE 2 about here

Bureaucratic costs. Implementation costs of integration have proved to have particularly important negative effects, especially because they are so difficult to anticipate. Vertical merger increases the size of an organization which often results in additional hierarchical levels. Increasing size and bounded spans of control imply greater distance of most subordinates from their ultimate superiors. This may lead to communication distortion due to serial reproduction loss and/or deliberate distortion to achieve divisional objectives (Calvo & Wellisz, 1978; Coase, 1988; Cremer, 1980; Williamson, 1967) thus obviating a major advantage of integration.

The loss of high powered market incentives suggests that internal organization may also be more costly than the market mechanism (Williamson, 1985), undercutting the profit incentive for integration. One explanation is that the lack of direct competitive pressures on the cost of the intermediate products may allow increasing levels of slack (Cyert & March, 1963) and thus reduce profitability.

As firms vertically integrate away from the base business, they are also likely to become involved in new manufacturing or selling tasks. Managing at the manufacturing and distribution stages requires different skills than previously required by the firms only in upstream or downstream operations and inexperience may lead to comparatively high internal costs (Harrigan, 1985c; Porter, 1980). In short, the synergies created through vertical integration may be overestimated and do not compensate for higher costs (Harrigan, 1984).

Strategic costs. While Arrow (1975) suggested that vertical integration may eliminate the problem of asymmetric information, the flip side of the argument has been suggested by Harrigan (1984), namely that vertical integration may result in a loss of access to information and tacit

knowledge as relationships with experienced and more broadly based distributorships are severed. A second potential strategic cost to vertical integration is that the firm purchases specialized assets that increase sunk costs and may lead to chronic excess capacity and low profitability (Baumol, Panzar & Willig, 1982; Chandler, 1962; Rumelt, 1974). Third, vertical integration may link a firm to a weak adjacent industry (Harrigan, 1984) with an attendant loss in profitability. Fourth, vertical integration may decrease a firm's strategic flexibility and lead to high exit barriers (Harrigan, 1985d).

Production costs. Walker & Weber (1984) suggest that production costs are critical in the make-or-buy decision. A vertically integrated firm that does not utilize a sufficient amount of the input to achieve minimum efficient scale will be at a cost disadvantage against firms that contract out to an efficient supplier achieving full economies of scale (Stigler, 1968). Second, obsolete processes may be perpetuated with vertical integration (Harrigan, 1984). Third, vertical integration may lead to a capital drain, a potential problem that is particularly damaging to smaller firms (Williamson, 1975). Fourth, capacity imbalance in the vertically integrated firm may lead to higher production costs than incurred by firms that utilize market mechanisms (Hayes & Wheelwright, 1984).

Long-run dynamic costs. The make-or-buy decision also must take into account possible long-run costs. Internal organization may lead to inefficiency if, for example, internal divisions face no competitive pressures for procurement. Even if outside sources exist as a potential disciplining influence, they may be bypassed due to bureaucratic considerations. Second, a norm of reciprocity between divisions easily develops (Gouldner, 1960), and over time the benefits of reducing transaction costs are lost. Third, internal production may lead to an expansionary bias that compromises cost minimization (Williamson, 1975). Fourth, psychological commitment and administrative difficulties of divestment (Duhaime & Grant, 1984; Duhaime & Schwenk, 1985) are important dynamic costs that need to be considered in the make-or-buy decision.

The Isomorphic Nature of Vertical Integration and Vertical Contracting

While the possible strategic advantages of vertical integration are many, it is clear that the strategic costs of vertical integration may outweigh the benefits. Consequently, firms should be highly motivated to search for less costly methods of achieving the benefits of vertical control. It now will be argued that vertical contracting (i.e. exclusive dealing, resale price maintenance, exclusive territories, etc.) is a viable alternative to vertical financial ownership (Flaherty, 1981). In fact, **in the absence of transaction costs, vertical contracting can replicate the advantages of vertical financial ownership.**

The key argument is that the various motives provided for vertical integration (i.e. vertical financial ownership) just derived from the competitive strategy and economics literature, can be directly generalized to become arguments for vertical control and applied inter alia to long-term contracts, networking, equity joint ventures, as well as vertical integration. While written explicitly as theories of vertical integration, and analyzed as such in the previous section, this work can be read in a more general way as providing a theoretic foundation for explaining why the enterprise desires vertical control.

To illustrate the point that much of the vertical integration literature can be read in the more general terms of vertical control, research on vertical integration is matched with literature discussing other forms of vertical control in Table 3. A necessary difference between alternative forms of vertical control is the transaction costs involved. Table 3 thus ignores transaction costs, but considers the other three key advantages of vertical integration first summarized in Table 1.

Insert Table 3 about here

Table 3 suggests, for example, that vertical integration is not the only way of creating entry barriers. Exclusive territories, exclusive dealer arrangements, long-term contracts and vertical price-fixing (resale price maintenance) may be used as strategic entry barriers (Aghion & Bolton, 1987; Comanor & Frech, 1985) in ways that are very similar to the protection created by

vertical integration. In both cases, firms monopolize the downstream (or upstream) market and thus raise rival's costs (Krattenmaker & Salop, 1986; Salop & Scheffman, 1983).

The regulated firm similarly need not have full vertical integration to avoid rate-of-return regulation. Transfer pricing via quasi-integration would suffice (Blois, 1972). If vertical control is needed to maintain an oligopolistic pricing structure, tying contracts have been expressly used for this purpose (Burstein, 1960a).

Moving to input and/or output price discrepancies as a motive for vertical integration, alternative vertical constraints such as exclusive territories, exclusive dealing, franchise fees, resale price maintenance and/or forcing tie-in purchases also may be used to maintain control. The general argument is that promotional efforts, determination of final price, and uses of technology are important decisions frequently made by the downstream firm (retailer) that influence the profitability of the upstream firm (manufacturer). The upstream firm has a strong incentive to control the downstream firm's decisions, but this control can be achieved in many ways.

In the successive monopoly case, a franchise fee or resale price maintenance, where the manufacturer mandates that the dealer cannot exceed the profit-maximizing price, replicates the vertical integration outcome (Blair & Kaserman, 1983; Rey & Tirole, 1986). In the case of bilateral monopoly, Machlup and Taber (1960) argued that if two separate firms bargain about price and quantity, they could achieve joint profit maximization without vertical integration being required. Burstein (1960a) explored the variable proportions incentive for vertical integration and argued that the upstream monopolist could obtain identical results by tying the purchase of the nonmonopolized substitute inputs to the purchase of the intermediate product over which the monopolist has control.

Price discrimination could be achieved by tying arrangements rather than vertical integration (Blair & Kaserman, 1983; Burstein 1960b). For example, companies have tied staplers to stapling machines, rivets to riveting machines, computer cards to computers, and paper supplies to electrofax copying machines (Blackstone, 1975). Territorial restrictions coupled with resale price maintenance could also facilitate price discrimination (Phillips & Mahoney, 1985).

The final key advantage comes from uncertainties about costs and/or prices. In the case of asymmetric upstream information (Arrow, 1975) auxiliary markets might convey the information without vertical integration. Arrow assumes, however, that upstream producers will have severe difficulties in selling information, which may or may not hold true empirically. Second, he assumes that a forward-contract cannot be written that would enable downstream firms to make correct investment decisions (Teece, 1980). If these conditions do not hold, vertical integration may still be the strategy of choice.

In the Carlton (1979) model the analysis of vertical integration explicitly refers to either long-term contract or vertical integration. Thus, in Carlton's view, the desire to shed risk by itself does not provide a powerful incentive for vertical integration. Firms concerned with the supply of an input (Walker & Weber, 1984) could write contracts which include a large penalty such as holding hostages (Williamson, 1983), collateral (Benjamin, 1978), or deferred rebates, performance bonds and liquidated damage provisions (Goldberg, 1979; Telser, 1980).

In terms of product quality and service, Harrigan (1986) persuasively argues that new pioneering products and high quality differentiated products require vertical integration to insure that quality is maintained through the linkages of the value-added chain (Anderson & Coughlan, 1987; Walker, 1988). A manufacturer can use forward integration to differentiate his product by providing a higher level of service at the distribution level than would an independent distributor (Coughlan, 1985; Etgar, 1978). However, manufacturers of new products frequently use vertical contracts to achieve the same objective. For example, the manufacturer may use exclusive territories or resale price maintenance to achieve high quality service. By reducing price competition, the manufacturer induces the retailers to compete on service and other nonprice terms. Vertical price-fixing contracts between the manufacturer and retailers mitigates free-rider problems (Goldberg, 1984; Oster, 1984; Telser, 1960) by eliminating discounters and enabling the manufacturer to signal quality via retail endorsement (Klein & Murphy, 1988; Marvel & McCafferty, 1984; Phillips & Mahoney, 1985). This seems to have been the rationale explaining resale price maintenance for high quality products such as Lenox china and Magnavox televisions (Goldberg, 1982), Sony electronics, Florsheim shoes, and London Fog and Misty Harbor raincoats

(Overstreet, 1983).

Similarly, exclusive territories and resale price maintenance provide incentives for retailers to offer services to the customer on behalf of the manufacturer, and exclusive dealing provides incentives for the manufacturer to undertake promotional services that benefit the retailers (Marvel, 1982). In short, the problem of shirking (Alchian & Demsetz, 1972; Jones, 1984) may be solved by relational contracting (Williamson, 1979) as well as by incorporation.

Researchers have maintained that vertical integration is an institutional response to technological uncertainty (Teece, 1982), to the difficulty of trading information (Arrow, 1971), and to internalize externalities such as R & D spillovers (Phillips, 1983). Vertical integration also is suggested as a means of protecting value-creating aspects of proprietary products or process technology (Lippman & Rumelt, 1982). However, internal organization may not be necessary to alleviate these problems. Joint ventures, for example, are often a sufficient organizational response to minimize the difficulties inherent in technology transfer (Hennart, 1988a; Kogut, 1988).

All of these insights on the complementarity of vertical integration and other forms of vertical control such as contracts, exclusive territories and joint ventures can be expressed more generally in terms of agency theory. This perspective (Eisenhardt, 1989; Oviatt 1988) suggests that a vertical contract can always be written to achieve the vertical integration outcome (Evans & Grossman, 1983) when we ignore the problems of bounded rationality and transaction costs. In fact, vertical contracts represent one of the most obvious applications of agency theory (Mathewson & Winter, 1984; Rey & Tirole, 1986).

More broadly, the agency perspective provides the necessary theoretical link for describing vertical integration as one option along a continuum of corporate alternatives for achieving vertical control. The last piece of theoretic apparatus needed to model and understand vertical integration is the ability to predict and even prescribe alternative organizational forms for achieving control along a vertical control continuum. It is to this important task that the last section of the paper is devoted.

A Framework for Predicting Organizational Form

While the great insight of the agency theory perspective is that vertical contracting and vertical ownership are theoretically equivalent, the agency perspective fails to consider the importance of asset specificity in executing an optimal vertical integration strategy. A transaction cost approach (Williamson, 1979) provides insight into the key role of asset specificity, but neglects the interactive effects highlighted by agency theory. Combining these two perspectives enables us to make predictions and offer prescriptions on the make-or-buy decision.

Table 4 summarizes the extensive subset of the vertical integration literature that deals directly with three variables that are central to the agency and transaction cost perspectives. In general, the agency perspective emphasizes information asymmetry issues.

Insert Table 4 about here

A significant aspect of information asymmetry in organizations is the problem of rewarding effort in team production (Jones, 1984). This leads to the so-called "**non-separability problem**" (Alchian & Demsetz, 1972). If reward cannot be based on output, a manager is necessary to monitor behavior or effort. A second important agency theory variable concerns knowledge of the transformation process or **task programmability** (Eisenhardt, 1985; Ouchi, 1979). Low task programmability reduces the effectiveness of monitoring. As Table 4 shows, a good deal of the literature on the vertical integration decision has been concerned with such uncertainties, and the results in general suggest that as uncertainty increases, vertical integration is increasingly likely.

The transaction cost approach emphasizes asset specificity as the fundamental variable in determining the optimal vertical integration strategy (Williamson, 1979). When assets are not closely tied to a specific strategy, the theory suggests that market and informal means of coordination will be preferable corporate strategies. Vertical integration makes sense only when assets are idiosyncratic and closely tied to a specific strategy.

The integration of the transaction cost and agency approaches yields task

programmability, nonseparability, and asset specificity as three determinants of vertical integration strategy. To highlight the interactive effects of these variables, consider each in a dichotomous (low, high) form, as shown in Table 5.

Insert Table 5 about here

This table suggests a synthetic theory of corporate vertical control. Drawing together empirical evidence from two fields of inquiry--strategy and economics--and applying insights from two theoretical perspectives--transaction cost and agency theory--it offers a more detailed approach to the corporate control option than previously available.

In its simplified form, the theoretic perspective can be expressed in eight different circumstances which might face the corporation. When productivity of the individual is easily measured and asset specificity is low (case 1), the market mechanism (spot market contracting) should run smoothly. Vertical integration can add very little to this scenario; it is unlikely to be considered, and is highly unlikely to be cost effective if tried. When asset specificity is high but nonseparability is low (case 2), some form of long-term contracting will be required. Payment by outcome will suffice, however, since productivity is separable. Where task programmability is low and nonseparability problems are high (case 3), relational contracting such as joint ventures may be necessary. However, asset specificity is also low in this scenario. Unified governance (vertical financial ownership) is not required.

The worst case scenario for choosing the market mechanism as a strategy of vertical control occurs when monitoring behavior is not effective (low task programmability), observing output is not satisfactory (high nonseparability), and asset specificity is high (case 4). Unified governance or some type of clan relationship (Ouchi, 1980) is predicted in situations presenting this mix of variables. The best case scenario for choosing the market mechanism, on the other hand, occurs when measurement of input (high task programmability) and output (low nonseparability) are effective and asset specificity is low (case 5). Here spot market contracting is the predicted organizational choice.

With high asset specificity (case 6) some type of relational contracting will be necessary. But since monitoring of effort is effective here, relational contracting will suffice to minimize opportunistic behavior. When transactions involve high task programability, high nonseparability and low asset specificity (case 7) we can use Alchian and Demsetz' (1972) model where a monitor is needed to ascertain individual effort. The inside contracting system (Williamson, 1975) or quasi-firm (Eccles, 1981) also illustrate the "manager as monitor" model. Finally, vertical financial ownership (unified governance) is predicted when asset specificity (sunk cost) is high and nonseparability problems are high (case 8). Since task programmability is high, monitoring of effort will be effective.

Conclusion

A great deal of attention has been given to diversification as a basic corporate strategy (Ramanujam & Varadarajan, 1989). This paper suggests that vertical integration, or more broadly vertical control, is an option with similar complexities deserving increased research attention. Recent efforts by industrial organization and strategic management researchers to expand our theoretical and empirical understanding of vertical control (which includes vertical contracting, networks, and vertical merger) has been exciting and fruitful. We have begun to understand complex phenomena that were ignored or treated as strategic puzzles a decade ago. On the other hand, at present this work is somewhat disjoint, with individual researchers tending to respond to increasingly specific debates about the details of different vertical integration scenarios.

The underlying proposition of this paper is that new theoretical insight is most likely to take place at the interface of the strategy and economics literature and be achieved by more broadly conceptualizing vertical integration. More specifically, new insights into vertical integration may be found by considering vertical mergers as one end of a vertical control continuum that also includes vertical markets and vertical contracting. Even more broadly, it has been argued that the theory of vertical integration and the theory of the firm are isomorphic.

Expanding the horizons of discourse in this way gives us access to a much richer set of theoretic tools. Insights from the agency literature (Eisenhardt, 1989; Jensen & Meckling, 1976),

the organizational economics literature (Barney & Ouchi, 1986), the property rights literature (Alchian, 1982; Jones, 1983; Grossman & Hart, 1986) and a dynamic resource-based theory of the firm (Nelson & Winter, 1982; Penrose, 1959; Rubin, 1973; Wernerfelt, 1984) become available for enhancing our knowledge of vertical integration strategy.

The key theoretic advance of the paper is achieved by integrating the agency literature with transaction cost ideas found in the organizational economics literature. The organizational economics literature has underemphasized information asymmetries. The agency literature relies on assumptions about information asymmetries and risk aversion (Eisenhardt, 1989) but ignores asset specificity, a topic given considerable attention in transaction cost analysis. A synthesis of the two perspectives is used to predict and prescribe the optimal vertical integration strategy. The choice among vertical control strategies outlined in the specific model depends upon the degree to which non-separable team effort is required, the ability to program tasks and the level of asset specificity. Different mixes of these variables lead the firm to scenarios that extend from spot market contracting to complete financial control via vertical integration.

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Table 1 Some Advantages of Vertical Integration

(1) **Transaction cost considerations**

- (i) Capture tax incentives
- (ii) Redress market failures
- (iii) Adapt to high uncertainty, and/or high frequency
- (iv) Avoid costs associated with asset specificity
- (v) Create economies of scope

(2) **Strategic considerations**

- (i) Increase entry barriers
- (ii) Price squeeze smaller competitors from market
- (iii) Circumvent regulation
- (iv) Maintain oligopolistic discipline

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(3) **Output and/or input price discrepancies**

- (i) Successive monopoly & successive oligopoly
- ii) Bilateral monopoly
- (iii) Upstream monopoly
- (iv) Price Discrimination

(4) **Uncertainty about costs and/or prices**

- (i) Asymmetric information
- (ii) Demand uncertainty
- (iii) Measurement uncertainty
- (iv) Quality uncertainty
- (v) Technological uncertainty
- (vi) Appropriate R&D spillovers
- (vii) Trade technology

Table 2 Some Disadvantages of Vertical Integration

(1) **Bureaucratic costs**

- (i) Diminishing returns to management
- (ii) Higher cost of internal organization
- (iii) Increase in number of management functions
- (iv) Lost economies of scope due to poor organization

(2) **Strategic costs**

- (i) Less access to information from suppliers
- (ii) Increased sunk costs in specialized assets
- (iii) Stronger ties to weak adjacent industries
- (iv) Lost flexibility (High exit barriers)

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(3) **Production costs**

- (i) Lost economies of scale
- (ii) Obsolete technologies
- (iii) High overhead cost (Capital drain)
- (iv) Capacity imbalance

(4) **Long-run dynamic costs**

- (i) Lack of direct competitive pressures
- (ii) Internal persistence bias
- (iii) Internal expansion bias
- (iv) Problems with divestment

Table 3 Motives for Vertical Control

Motive	Paper suggesting vertical financial ownership	Paper suggesting vertical contract
(2) Strategic Considerations		
Entry Barriers	(Williamson 1971) (Porter 1980)	Exclusive Dealing Contracts (Comanor & Frech 1985)
Circumvent-regulation	(Dayan, 1975)	Transfer pricing via equity joint venture (Blois, 1972)
Maintaining oligopolistic discipline	(Adams & Dirlam, 1964)	Tying contracts or resale price maintenance (Burstein, 1960a)
(3) Output and/or Input Price Discrepancies		
Successive Monopoly	(Spengler, 1950) (Greenhut & Ohta, 1976)	Franchise fee or resale price maintenance (Rey & Tirole, 1986)
Bilateral Monopoly	(Williamson, 1971)	Contract bargaining (Machlup & Taber, 1960)
Upstream Monopoly	(Vernon and Graham, 1971) (Schmalensee, 1973)	Tying contract (Burstein, 1960a)
Price Discrimination	(Crandall, 1968) (Perry,1980)	Tying contract (Burstein, 1960b) (Blackstone, 1975) Territorial restrictions coupled with resale price maintenance (Phillips & Mahoney,1985)

(4) Uncertainties about Costs and/or Prices

Reduce asymmetric uncertainty	(Arrow, 1975)	Vertical contract (Teece, 1982)
Reduce or transfer risk	(Carlton, 1979)	Long-term contract (Carlton, 1979)
Assure Supply (Demand uncertainty)	(Walker & Weber, 1984)	Collateral (Benjamin, 1978) Deferred rebates (Goldberg, 1979)
Control quality and services	(Harrigan, 1986)	Exclusive territories (Goldberg, 1982) Resale price maintenance (Marvel & McCafferty, 1984; Phillips & Mahoney, 1985)
Reduce shirking (Measurement Uncertainty)	(Alchian & Demsetz, 1972)	Relational contract (Williamson, 1979)
Reduce technological uncertainty	(Teece, 1982)	Equity joint venture (Hennart, 1988a)
Appropriate R&D spillovers	(Phillips, 1983)	Vertical contracts (Evans & Grossman, 1983)
Trading of Technology	(Arrow, 1971)	Equity joint venture (Kogut, 1988)

Table 4 Empirical Research on the Vertical Integration Decision from Thirteen Key Empirical Studies*

Study/Sample/ Methodology	VI=Vertical Integration U =Uncertain AS=Asset Specificity		Measures	Results
Anderson & Schmittlein (1984) 16 electronic component manufacturers Survey data Logit analysis	VI	=	use of direct sales force	Volume uncertainty had no statistically significant effect on the likelihood of vertical integration. Measurement uncertainty increased vertical integration at a statistically significant level. Asset specificity increased the likelihood of the adoption of the vertical integration strategy at a statistically significant level.
	U	=	expected deviation between forecast and actual sales in the next year, expressed as a percentage (volume uncertainty)	
		=	the likelihood of perceived difficulty of measuring the results of individual salespeople equitably (measurement uncertainty)	
	AS	=	average of six (standardized) variables representing manager's perceptions of the importance of human capital specificity	
Anderson (1985) 13 electronic component manufacturers Survey data Logit analysis	VI	=	use of direct sales force	The more difficult it was to evaluate sales performance the greater the likelihood of vertical integration (statistically signicant). The greater the human capital asset specificity the higher the likelihood of vertical integration (statistically significant).
	U	=	difficulty of evaluating performance (measurement uncertainty)	
	AS	=	Company specificity and brand-specific know-how required.	

Armour & Teece (1980)	VI	=	number of primary production stages	Vertical integration is significantly associated (at the 95 % level) with basic and applied research expenditures. Human capital asset specificity of technological know-how necessitates vertical integration.
U.S.petroleum industry for the 1954-1975 period	AS	=	firm's expenditure on basic, applied, or development research	
Regression analysis				
Caves & Bradburd (1988)	VI	=	input-output measure on the distribution of each industry's shipments among other industries	Small numbers bargaining and firm-specific sunk capital were positively associated with vertical integration at a positive and statistically significant level.
83 U.S. Industries for 1975	AS	=	(a) joint fewness of sellers & buyers	
Regression analysis			(b) capital intensity that is potentially sunk and specific to the industry	
Harrigan (1986)	VI	=	measures of degree, stages, breadth and form of VI	Both volume uncertainty and technological uncertainty led to less vertical integration at a statistically significant level
192 firms from 16 industries from 1960-1981	U	=	changes in sales growth (volume uncertainty)	
Chi-square tests		=	years to obsolesce technology (technological uncertainty)	

John & Weitz (1988)	VI	=	percent sold directly to end users	Vertical integration was positively and
87 industrial good firms	AS	=	human capital asset specificity	significantly related to asset specificity and environmental uncertainty.
Survey data Regression analysis Logit analysis	U	=	average response of 5 items including industry, market share, and sales forecasting volatility	Production costs were not statistically significant.
Joskow (1985)	VI	=	utility ownership of mines	While 85% of the coal used to generate electricity is
277 observations of contracts or complete ownership by coal-burning electric generating plants	AS	=	mine-mouth plants which involved site specificity, physical asset specificity and dedicated assets	supplied by the market mechanism, virtually all of the mine-mouth mines are owned by utilities
Levy (1985)	VI	=	value-added/sales (enterprise-based census data)	Volume uncertainty, fewness of firms, and research intensity each increased the likelihood of vertical integration at a statistically significant level
69 firms representing 37 different industries for the years, 1958, 1963, 1967, 1972 regression analysis	U	=	log of firms sales regressed on a time trend, the variance of the error term is used as a measure of uncertainty	
	AS	=	small numbers of firms and the intensity of research and development expenditures	

MacDonald (1985)	VI	=	the proportion of shipments from manufacturing industries that are made to affiliated units (U.S. Census of Manufacturers)	The use of vertical integration is more prevalent in capital intensive industries and in those four digit characterized by high levels of buyer or seller concentration at a statistically significant level
79 three and four digit producer goods industries for 1977	AS	=	small numbers (high buyer or seller concentration)	
regression analysis		=	capital intensity, which is measured by the ratio of fixed assets to shipments	
MacMillan, Hambrick, & Pennings (1986)	VI	=	(1-purchases/costs of goods sold)	Volume instability led to an increased likelihood of backward integration for consumer, capital, and component supplier businesses at a statistically significant level.
178 consumer 99 capital 275 component businesses	U	=	Four-year mean absolute deviation of served market sales from served market growth rate	
regression analysis	AS	=	Gross book value of plant and equipment per dollar of revenues	Asset specificity/ capital intensity increased the likelihood of backward integration for consumer, capital, and component supplier businesses at a statistically significant level.
Masten (1984)	VI	=	make or buy survey data	Components that were complex and specialized were more likely to be made in-house at a statistically significant level.
1,887 component specifications for the aerospace industry	U	=	if the component is highly complex	
Maximum Likelihood procedure	AS	=	if the component is highly specialized	

Monteverde & Teece (1982)	VI	=	80 percent or more of the component requirements produced in-house	Backward integration was more likely when the engineering effort required to design a part was high, suggesting the importance of human capital asset specificity.
Ford & General Motors for 1976, 133 auto components probit analysis	AS	=	amount of engineering effort required in designing a part	
		=	part made specifically for a single assembler	Backward integration was also more likely when the parts were firm-specific.
Walker & Weber (1984; 1987)	VI	=	make or buy decision	High volume uncertainty leads to a make decision in low competition (but not high competition) markets
	U	=	Volume uncertainty (a) expected volume fluctuations	
60 components of an automobile manufacturer			(b) uncertainty of volume estimates	
LISREL estimation using unweighted least squares		=	Technological uncertainty (a) frequency of changes in product specifications	Technological uncertainty has no influence on make-or buy decisions when supplier competition is low but leads to a buy decision when competition is high.
			(b) probability of technological improvements	

* Only the results relevant to the relationship between asset specificity, uncertainty and the adoption of vertical integration are briefly summarized here. For details, see the original references.

Table 5
Predicting the Organizational Form of Vertical Control

	Task Programability	Nonseparability Problem	Asset Specificity	Predicted Organizational Form
Case 1:	Low	Low	Low	Spot market contract
Case 2:	Low	Low	High	Relational contract
Case 3:	Low	High	Low	Relational contract
Case 4:	Low	High	High	Unified governance
Case 5:	High	Low	Low	Spot market contract
Case 6:	High	Low	High	Relational contract
Case 7:	High	High	Low	Inside contract
Case 8:	High	High	High	Unified governance

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